National Institute of Environmental Health Sciences

Local and global effects of climate on dengue transmission in Puerto Rico

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Abstract:

The four dengue viruses, the agents of dengue fever and dengue hemorrhagic fever in humans, are transmitted predominantly by the mosquito Aedes aegypti. The abundance and the transmission potential of Ae. aegypti are influenced by temperature and precipitation. While there is strong biological evidence for these effects, empirical studies of the relationship between climate and dengue incidence in human populations are potentially confounded by seasonal covariation and spatial heterogeneity. Using 20 years of data and a statistical approach to control for seasonality, we show a positive and statistically significant association between monthly changes in temperature and precipitation and monthly changes in dengue transmission in Puerto Rico. We also found that the strength of this association varies spatially, that this variation is associated with differences in local climate, and that this relationship is consistent with laboratory studies of the impacts of these factors on vector survival and viral replication. These results suggest the importance of temperature and precipitation in the transmission of dengue viruses and suggest a reason for their spatial heterogeneity. Thus, while dengue transmission may have a general system, its manifestation on a local scale may differ from global expectations.

Source: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2637540

Resource Description

Early Warning System: ☑

resource focus on systems used to warn populations of high temperatures, extreme weather, or other elements of climate change to prevent harm to health

A focus of content

Exposure : ☑

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Precipitation, Temperature

Temperature: Fluctuations

Geographic Feature: ☑

resource focuses on specific type of geography

Ocean/Coastal, Tropical

☑

Geographic Location: ☑

resource focuses on specific location

Non-United States

Non-United States: Non-U.S. North America

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: Mosquito-borne Disease

Mosquito-borne Disease: Dengue

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology: ☑

type of model used or methodology development is a focus of resource

Outcome Change Prediction

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Short-Term (

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content